

PHOTO PRINTING METHOD AND SYSTEM USING A PLURALITY OF PRINTERS

BACKGROUND OF THE INVENTION

5 FIELD OF THE INVENTION

This invention relates to a photo printing technique using a processing device for transmitting image information to a plurality of printers through signal paths to print images.

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DESCRIPTION OF THE RELATED ART

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In a photo printing technique employing the above construction, a processing device capable of image processing may be connected to a plurality of printers through signal paths such as communication cables, and image information may be transmitted from the processing device to the printers. In printing images with this system, the printers are selectively used and image information is transmitted thereto by manual operations carried out at the side of the processing device.

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In making numerous prints, a processing time may be reduced by distributing the image information to the plurality of printers. However, where the distribution is done manually, the operator must distinguish the states of the printers to determine which printer has finished printing, and transmit image information to that printer. This operation must be repeated until all required prints are made. Not only is this operation too time-consuming and troublesome, but also a proper distribution process may not be performed. For example, a delay could occur in the distributing operation, or the operator could make an error in the order of priority for a printing process. Thus,

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there is room for improvement.

Japanese Patent Laying-Open Publication H10-78620, for example,
discloses a technique for varying an order of printing according to
requested delivery times after receiving a plurality of orders for prints.
However, this publication does not describe a manner of managing
image data in the plurality of orders to be transmitted to printers for
printing.

In particular, photo prints may be made from image information
acquired with digital cameras fast becoming widespread today. When
this printing process is performed at a photo processing shop, a storage
medium storing image information acquired with a digital camera may
be brought in to make prints. Even though the photo processing shop
may have a plurality of printers, it is not only time-consuming to select
printers manually, but also difficult to make a proper distribution of
image information in a proper order, in handling a large number of
storage media received. In addition, when prints are made from such
storage media, it is necessary to manage, as a unit, a plurality of image
data stored in each storage medium by allocating an order number.
Such a complex process may not allow the printing process to be
completed in a short time.

SUMMARY OF THE INVENTION

The object of this invention is to provide an improved technique of
printing images by managing a plurality of printers while dispensing
with a complex operation.

The above object is fulfilled, according to this invention, by a photo

printing method for transmitting image information to a plurality of
printers through signal paths to print images, comprising an order
managing step for managing inputted image information on an order-
by-order basis, a distributing step for distributing orders to the
5 plurality of printers to be printed, and an outputting step for outputting
image information included in each order distributed, to a selected
printer based on an operating status of the selected printer.

10 With the above method, the order managing step is executed to manage
a plurality of pieces of image information on the order-by-order basis,
and the distributing step and outputting step are executed to distribute
the image information to the plurality of printers, with the orders
assigned to the respective printers. This requires no special operation
performed by the operator. Prints obtained by this processing are
15 outputted by the printers as sorted for the orders, which facilitates
management of each order. Here, the order is a unit of service
requested. Take image information acquired with digital cameras and
saved in storage media for example. One order is a unit for handling,
en bloc, a plurality of pieces of image information saved in one storage
20 medium.

In a preferred embodiment of the invention, the distributing step
includes assigning priorities to the orders, and the outputting step
includes outputting the image information in an order of higher priority
25 to one of the printers in a state for accepting printing data.

Thus, the distributing step is executed to assign priorities to a plurality
of orders, and the outputting step is executed to transmit image
information in an order of higher priority to one or more of the printers
30 in a state for accepting printing data. Thus, while increasing the

operating rate of all the printers, printing is completed the earlier for orders of the higher priority. Particularly since printing data is transmitted to the printers in a state for accepting data, idle time is reduced to realize efficient processing, compared with the case of transmitting data after fully completing printing of a preceding order.

Preferably, printing data in corresponding orders is divided in units of frames and successively transmitted, to data storage devices of the printers, amounts of data for the number of frames storable in the data storage devices.

Even where each printer is equipped with a data storage device such as a buffer or memory having a capacity not large enough to store all image information in one order, printing data in the orders corresponding each printer is divided in units of frames and amounts of data storable in the data storage device are transmitted successively. Thus, image information may continue to be transmitted without interruption to the plurality of printers, compared, for example, with the case of executing a next process after all image information in an order corresponding to one printer is transmitted to the printer.

It is preferred that, when printable image information is image information in one order and the plurality of printers are available for printing, frame image information in that order is transmitted as distributed to the plurality of printers.

When printing printable image information in only one order, image information for a plurality of frames included in that order is distributed to the plurality of printers. Thus, image information for a plurality of frames may be printed in a short time.

A photo printing system for transmitting image information including photo frame image data to a plurality of printers through signal paths to print images, according to this invention, comprises a memory for loading image information transmitted from an image input device, a print order managing unit for managing the image information on an order-by-order basis, a distributing unit for applying printer IDs identifying the printers used, as attribute data, to the image information in the respective orders, a printer control unit for checking an operating status of each of the printers, and a data output unit for transmitting, based on a signal from the printer control unit, photo frame image data in an image file to be printed from the memory to one of the printers specified by the attribute data of the image file.

This system realizes the same advantages as provided by the method described above.

Where the distributing unit applies the attribute data to the respective photo frame image data, additional information regarding a printing process may be provided for each photo frame image data. This achieves a thorough-going printing service.

Particularly where the distributing unit applies different printer IDs to the photo frame image data belonging to the image file of the same print order, the photo frame image data included in the same print order may be printed speedily by distributing the image data to the plurality of printers.

Thus, the technique proposed by this invention provides an improved method and system for managing a plurality of printers to enable quick

printing on an order-by-order basis, without requiring a troublesome operation to be carried out by the operator. Not only improving the operating rate of the printers, but also orders of higher priority may be finished early. Even where the printers have small-capacity data storage devices, a printing process is performed without interruption. When only one order is put to a printing process, prints are made promptly.

Other features and advantages of this invention will be apparent from the following description of the embodiment to be taken with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an overall view of a photo printing system;

Fig. 2 is a flow chart of a basic processing operation;

Fig. 3 is a flow chart of an image input routine;

Fig. 4 is a flow chart of an image correction routine;

Fig. 5 is a flow chart of a printing routine;

Fig. 6 is a flow chart of a print execution routine;

Fig. 7 is a view of an initial menu screen;

Fig. 8 is a view of a screen displayed at an initial stage of an image input process;

Fig. 9 is a view of a screen for inputting a file name;

Fig. 10 is a view of a screen displaying a list of files in time of a
5 correction process;

Fig. 11 is a view of a screen for the correction process;

Fig. 12 is a view of a screen displaying a list of files in time of printing
10 process;

Fig. 13 is a view of a file structure displayed in time of printing process

Fig. 14 is a functional block diagram showing a function for distributing
15 image information according to this invention; and

Fig. 15 is a view showing a construction in a different embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

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An embodiment of this invention will be described hereinafter with
reference to the drawings.

As shown in Fig. 1, a photo printing system includes an image
25 processing device 40 and a print order managing device 50 formed of
hardware and software with a general-purpose computer 4 acting as a
core element. The computer 4 has a display 1 such as a CRT or liquid
crystal display, and a keyboard 2 and a mouse 3 acting as command
input devices. The computer 4 has also a media reader 7 acting as an
30 image input device for fetching image information from a storage

medium 6 such as a CompactFlash card or SmartMedia card storing image information acquired with a digital camera 5. A plurality of printers P are connected to the computer 4 through signal paths L. In this photo printing system, the signal paths L are formed of SCSI buses, and ID numbers are affixed to the respective printers P. Each printer P has a sublimite print head built into a main body 8, prints images with the print head on printing paper set in a cassette 9, and outputs the printing paper to a discharging portion 10.

In this photo printing system, the computer 4 saves the image information inputted from the media reader 7 to a hard disk or memory built into the computer 4. The computer 4 has a program set thereto for performing a color correction and a brightness correction of the image information (image files, frame image data and so on) stored, and distributing the image information to the printers P for printing images.

This photo printing process may be outlined as shown in the flow chart of Fig. 2. Specifically, an initial menu shown in Fig. 7 is displayed on the display 1 at an initial stage. One of the options "Image input", "Image correction" and "Print" displayed may be selected to initiate a corresponding process (steps #101-#105, #200, #300 and #400). For selecting one of "Image input", "Image correction" and "Print" from the initial menu, the keyboard 2 or mouse 3 or a touch panel appearing on the display screen is operated to move a cursor to a selected position, and an "OK" switch displayed on the screen is operated. That is, the cursor is placed in the position of "OK" and a predetermined key on the keyboard 2 is pressed or the mouse 3 is clicked.

When "Image input" is selected, a process is executed as shown in the

flow chart of Fig. 3. That is, as shown in Fig. 8, a message appears on the screen urging the operator to set a storage medium 6 to the media reader 7. After a medium setting is confirmed, a file is created, and an order number is automatically affixed to this file (steps #201-#204).

5 When affixing an order number to the file, a message shown in Fig. 9 may be displayed for the operator to choose to input a selected file name from the keyboard 2. Next, image information is read from the storage medium 6 set to the media reader 7, frame after frame in the order of image frame numbers. This process is carried out until image

10 information of all frames is saved to the hard disk or memory of computer 4, as controlled with the file created as noted above. When the saving process is completed, a message indicating the completion is displayed on the display (steps #205-#207). As noted above, the file has an order number and order name affixed thereto for identifying the

15 file. Besides, information such as the number of frames (i.e. the number of images), the date of file creation, and the data volume of the entire file (usually in bytes) is stored in the header area or the like of the file. When the saving process is completed, the display 1 returns to the screen shown in Fig. 7. The image processing device 40 of

20 computer 4 prepares, in the background, image information to be outputted to the printers P from the image information stored. This image information to be outputted to the printers P is handled order by order based on the order numbers affixed to the files.

25 When "Image correction" is selected, a process is executed as shown in the flow chart of Fig. 4. That is, a list of files stored in the hard disk or memory is displayed (step #301). As shown in Fig. 10, this display shows file names with smaller numbers affixed to the files saved earlier. The list may be scrolled to show all files. Next, a file to be corrected

30 may be selected from this list by placing the cursor on the file or

inputting the file number from the keyboard, or by using the touch panel noted hereinbefore. The image information in the file specified is displayed in thumbnails as shown in Fig. 11. When image information to be corrected is selected from the displayed images by a similar operation, a correction window is opened as shown in the same figure. A process is performed according to options included in the window (steps #302-#307). When image information is corrected by this "Image correction" routine, corresponding image information for print output is corrected by the image processing device 40.

When "Print" is selected, a process is executed as shown in the flow chart of Fig. 5. That is, a list of files stored in the hard disk or memory is displayed, and print setting information is inputted, as necessary, for each file displayed (steps #401 and #402). Specifically, the display 1 shows a list of files in the form shown in Fig. 12. Each of the files listed stores, as shown in Fig. 13, a "priority number" indicating a place in the order of priority for printing, a "file number" (file name) identifying the file, a "printed frame" specifying the frames to be printed, a "print size" specifying a print size, a "number of prints" indicating the number of prints to be made, and an "identification number of printer". The priority number reflects an order of input through the medium reader 7. For changing the order of priority for printing, the mouse 3 may be operated only to drag a selected file to a different row in the list, for example. Where necessary, the file number (file name) may be changed. The printed frame is initially set to "All frames", but a selected number may be set for a selected frame as necessary. The print size is initially set to "Standard", but a selected size may be set as necessary. The number of prints is initially set to "One each", but a selected number of prints may be set as necessary. This list of files may be scrolled to show all files.

Next, when a "start" button displayed on the display 1 as shown in Fig. 12 is operated, checking is made whether any printers P are idle (i.e. in a state for accepting printing data <Ready state>). When the printers
5 P are idle, image information is printed by the printers P allocated by designating the identification numbers of printers P corresponding to the files. This printing process is continued until image information in all files is printed (steps #403-#406). In allocating the printers P (step
#404), when only one printer P is found idle, a file with the highest
10 priority is set to that printer P (by specifying the identification number). When a plurality of printers P are idle, orders are assigned to each printer P from files of higher priority to those of lower priority.

In transmitting image information from the computer 4 to each printer
15 P, a volume of image information (the number of images or frames) transmitted at a time is determined based on the capacity of data storage such as a buffer or memory provided for the printer P. Each printer P in the system embodying this invention has a buffer acting as data storage and having a capacity for image information corresponding
20 to two prints (two frames) in standard size. In executing printing (step #405), as shown in the flow chart of Fig. 6, image information for two frames to be printed of an order allocated to each printer P is transmitted successively to the printer P. The same process shown in Fig. 6 is repeated for image information for the next two frames. In
25 this way, image information in each order is transmitted. Each printer P starts printing immediately upon receipt of the image information. Image information for an index print is transmitted at the end of printing of each order, to print an index. Next, checking is made whether any printer P has finished printing all image information in a
30 file allocated to the printer P. When a printer P has finished printing,

"Idle" information is set to identify the available printer P, so that a next order may be allocated to this printer P (steps #405a-#405d).

The printing process is executed by effectively using the plurality of printers according to this invention described above. This is achieved by the functions of the print order managing device 50 constructed by hardware and software in the computer 4. This aspect will be described with reference to Fig. 14.

This print order managing device 50 manages, on an order-by-order basis, image information loaded into memory 41 of the computer 4 through the image input device 7. The image information includes image files having frame image data, and attribute data linked to the image files. The attribute data includes an order of printing, the number of prints, and a printer ID. The order of printing is set for each image file, while the number of prints and printer ID may be set for each frame image data.

This print order managing device 50 includes a printer managing unit 51 for acquiring an operating status (printing, finished printing or preparing for printing) from each printers P, an input command processing unit 52 for creating print setting information (the number of prints, printing priorities and so on) from commands inputted through the input device such as the keyboard 2 acting as a command input device, a distributing unit 53 for writing attribute data for printer selection to the image files or frame image data loaded into the memory 41 of computer 4 through the image input device 7, and a data output unit 54 for transmitting pertinent frame image data from the memory 41 to pertinent printers P based on a trigger signal from the printer managing unit 51.

The distributing unit 53 writes an order of printing and the number of
 prints to the attribute data in the image file of a corresponding order
 based on the print setting information transmitted from the input
 5 command processing unit 52, and writes a printer ID to the attribute
 data based on operating status information on the printers P
 transmitted from the printer managing unit 51. At this time, the order
 of printing is set, as a default value, an order in which the image files
 are loaded into the memory 41. The printer ID determines a printer P
 10 to be used. Priority is given to a printer P currently in idle state or a
 printer P with the least operating load at that time. When the printers
 P have different specifications, a printer P meeting desired printer
 specifications is selected.

15 The data output unit 54 outputs frame image data from the memory 41
 to a selected printer P, triggered by operating status information on the
 selected printer P from the printer managing unit 51, i.e. a status
 signal indicating a completion of printing or printing data acceptance
 permission. The data output unit 54 has a function to check an order
 20 completion so as to transmit continuously frame image data belonging
 to each image file created on the order-by-order basis. That is, unless
 an order is completed, frame image data in the same image file is read
 from the memory 41.

25 Thus, in the photo printing system according to this invention, one
 computer 4 is capable of a managing process for managing a plurality of
 images by file format, and an distributing process for distributing the
 image information managed as above to the printers P on the order-by-
 order basis. Image information stored in the computer 4 may be
 30 printed efficiently by using the plurality of printers P, without requiring

a manual operation to select among the plurality of printers P, and without leaving the printers P in idle state (inactive state). Moreover, each storage medium 6 is associated with one file and, in time of printing, each file is associated with one printer P. Thus, image information in each order is printed as one unit by one printer P, to facilitate the management of orders. Since images are printed file by file according to a predetermined order of priority, required image information may be printed and delivered to customers promptly only by assigning priorities before printing. Moreover, the display 1 shows a list indicating a relationship between order and printer P. When printing is completed, finished prints may be sorted order by order with ease. Image information in each order is transmitted successively as divided in units of frames storable in the buffer of printer P corresponding to the order. Though the buffer of each printer P has a small capacity, the printing process need not be interrupted.

[Different Embodiment]

Besides the above embodiment, this invention may be implemented as follows. Like reference numerals are used to identify like parts in this embodiment which are the same as in the foregoing embodiment.

As shown in Fig. 15, when a storage medium 6 from a digital camera is received at a terminal A of a photo processing shop S not having a printer P for printing digital images, image information in the storage medium 6 may be inputted to this terminal A. A communication system may be formed to transmit this image information, through the Internet B and servers C, to printers P installed at other shops T in the vicinity, a particular service center U or the like, to have the image information printed. In this communication system, the server C at

the service center U corresponds to the processing device of this invention. The server C and a plurality of printers P at the service center U and signal paths L for transmitting image information to the server C and printers P constitute a photo printing system. When
5 printing images through this communication system, information identifying the photo processing shop S may be attached to the image information transmitted from the photo processing shop S. Then, finished prints may be delivered to the photo processing shop S by using a motorcycle delivery service or door-to-door delivery service. Thus,
10 with this construction, even a small photo processing shop not having printers P for printing digital images may provide printing services only by installing a communication terminal. When a photo processing shop having printers P for printing digital images has received large orders exceeding its processing capabilities, the above
15 system enables a processing with ease.

According to this invention, as described in the embodiments, the system is operable in a mode for printing images by distributing a plurality of orders to a plurality of printers P. This system may
20 operate also in a mode for distributing printing data in one order to the plurality of printers when the printers are available for printing. By selecting such a mode, the image information in the order may be printed in a short time to achieve an efficient processing.

25 In this invention, orders may be managed with increased reliability by using a printer capable of back printing to print order numbers and the like on the back of printing paper. The printers may be the type to print on silver salt printing paper. Image information processed by the system may be image information on photo films digitized by a scanner.

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